



Laser Balancing

In production or overhaul of turbine machinery—aircraft jet engines, for example—a key factor in assuring proper turbine performance is precise balancing of the rotor, a disc-like part which revolves around a shaft at extremely high speeds. By conventional methods, rotor balancing is a tedious and time-consuming task. It is a manual operation in which a rotor is spin-tested, then stopped to remove or add material for balance, spun again and rechecked in multiple runs until proper balance is attained. Rotor metal is removed by hand drilling or grinding; material is added in the form of prefabricated correction weights.

Looking for a more efficient, continuous method of rotor balancing, Lewis Research Center and Mechanical Technology Incorporated, Latham, New York jointly developed a fully-automatic laser machining process that

offers multiple advantages. It allows more precise balancing, removes metal faster, eliminates excess metal removal and other operator-induced inaccuracies, and provides significant reduction in balancing time, hence lower manufacturing costs.

Shown in operation in the accompanying photo, the system employs a cutting laser to remove metal at rates precisely controlled by a computer. In operation, the rotor is mounted on a balancing fixture and rotated. While the rotor is spinning, the computer detects the degree of imbalance, calculates the required corrections and feeds this information to a control unit. The controller positions the cutting laser so that it is aimed at the exact spot on the rotor where material is to be removed. The laser fires short-duration high-energy pulses, removing the required amount of material from each plane of the rotor until the computer determines that the programmed balancing tolerances have been satisfactorily achieved.